

What I expect from young researchers: Train yourselves to write competent proposals

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American society embraces risk-taking

When I read Dr. Osamu Shimomura's words, "Looking back now, I realize that I made several very risky choices at the crossroads in my life," it made me realize how Japanese people somehow seem to have grown timid about taking risks¹⁾. Regardless of our common perception that Americans have a rather composed approach to life, if someone aspires to become a full-fledged chemist in the U.S., he or she has to go through numerous surprisingly difficult trials for selection. Take the career path of a university professor for example: Entering a university, entering a graduate school, securing a postdoctoral position, becoming an assistant professor, becoming an associate professor, becoming a full professor, and then obtaining research grants. Many obstacles have to be overcome along the way, including changes of locations and institutes. At each stage, candidates are evaluated in a fairly severe manner. While climbing this career ladder, just a handful of handpicked elite and a great many failures emerge. And yet, in the course of these evaluations, few candidates become seriously despondent even if they fail. Interestingly, they manage to work something out even if they fail, and there is even a chance that they will pull off a stunning comeback at some point in the future. Relatively speaking, American society is equipped with a safety net in life. It is this safety net that allows young people to take on various challenges without hesitation. Such a social mechanism that offers a second chance at success derives from the way a nation was established and evolved. Therefore, we cannot expect Japanese society to establish such a safety net. And yet, I can't help but ask myself if we could find a way. For I believe that an ingenious researcher who can take risks and stand squarely against a common belief will hardly prosper in a society where there are few opportunities for a second chance.

The planning behind an excellent research proposal is the very source of fresh research

For those who are climbing such a career ladder in the U.S., it is essential to submit not only their resume showing their professional achievements but also detailed recommendation letters and an original proposal (project). In recent years, as PCs have become more user-friendly, markedly more people have been writing fairly substantial and content-rich proposals^{2,3)}. I feel that American universities and graduate schools offer relatively well-developed training to write such proposals. Any banal proposal which merely modifies the prevailing orthodoxy will never be accepted. To write a powerful proposal, you need both the willingness to change the future of science on your own and the self-esteem to sell yourself. Japanese people might find these notions

irreconcilable with their own, given our nation's cultural background as symbolized by the following proverbs: "The heaven knows, the earth knows, and people know (Murder will out)" and "The nail that sticks out gets hammered down." Nevertheless, I believe that such training as mentioned above is indispensable and an extremely important part of university and graduate school education for the sake of constantly generating human resources that open up entirely new areas of original research and in order for Japanese universities to aim at genuine globalization. This belief of mine reflects my expectation of at least a handful of elite Japanese: More specifically, I would like them to get at least as fresh ideas as American rising stars do.

Benefits of continuing with grant applications

Even if you become a full-fledged professor in the U.S., you will be required to write proper proposals for various grant applications year after year. More emphasis is placed on these far-reaching proposals rather than previous accomplishments. Of course, if this tendency becomes too strong, there is an obvious flaw, that is to say, an increasing number of trivial proposals will be submitted. And yet, the benefits of keep writing these solid proposals on a regular basis, at least one proposal every few years, are greater than expected. As you keep writing, you will develop the habit of constantly thinking about basic problems and how to refine your ongoing research. If you had only a thin veneer of knowledge, and you were suddenly told to write a proposal, you would find yourself out of touch. In addition, you need to be cautious about routine because many people, except for the best and the brightest, tend to become complacent about current situations and stop pursuing completely different ideas when their research has begun to proceed smoothly. "The curse of success" seems to be more powerful than expected.

Light and shadow of the U.S. grant application system

However, this does not mean that I unreservedly support the U.S. grant application system, which urges researchers to spend many hours writing project proposals literally in an endless stream. For your reference, some statistics show that U.S.-based researchers spend more than 70% of their actual working hours preparing their grant applications⁴⁾. That seems excessive. Furthermore, in the case of a newly-appointed assistant professor, he or she needs to start writing a project theme without any preparatory experiment data, and thus this assistant professor is most likely to write a mission-oriented proposal. Actually, curiosity-driven research themes are difficult to get accepted. On the other hand, the application forms have become thicker and bulkier to defend proposed projects. In addition, every applicant is required

to attach a huge list of references. Under these circumstances, rough applications are most likely to be eliminated or rejected at one of the evaluation stages. As a result, serendipity-oriented research is difficult to get approved, and this is not a good trend. As seen from the above, there are many negative aspects to the American grant system. To put it in perspective, however, this system retains the good spirit of supporting and giving applause to the rise of young and vigorous researchers as a realization of the American dream.

Train yourselves to write good-quality proposals

It is advisable to start practicing writing good proposals as early as possible. In addition, it is necessary to make astute comments about other researchers' proposals. In this way, you can develop the habit of observing science constantly from a broader and panoramic perspective. Furthermore, the confidence of "youth" is necessary in order to readily enter integrated and varied fields of research. Good research comes from broader study which covers adjacent fields as well. In this sense, you need to resist the temptation of specializing in just one chemical field. Integration with different fields will naturally promote the development of science, while you will subconsciously acquire knowledge and understanding about adjacent fields by writing bold research proposals. And, most of all, when any of your research proposals receive harsh criticism and you feel so upset that you can't even sleep well, that resentment will sow the seeds for an independent and full-fledged researcher. I hope that Japanese universities will include this kind of training and make the proposal-writing course compulsory in their education curriculum. I would also like to see good-quality research proposals becoming a more important selection criterion in various personnel matters throughout the career development process, rather than reliance on the conventional curriculum vitae (CV) which emphasizes previous accomplishments.

Japan needs to establish its own unique evaluation system for fostering talent

Writing of competent proposals will also foster competent evaluators. Even if a much-awaited creative proposal is submitted, it would not be accepted without fair evaluation. I would like to see Japan establish its own unique evaluation system, which should embrace the spirit of fostering young researchers in a positive manner, and which will foster researchers attentively over the long run and be able to promote the birth of serendipity, with slight differences from the American way.

References

- 1) Toshio Yamagishi, Mary C. Brinton, *Risuku ni Se wo Mukeru Nihonjin* (Japanese walking away from risks), Kodansha Gendai Shinsho.
- 2) Applicants for teaching positions at major U.S. universities generally write a substantial 5-10 page proposal in about a 10-point font size. Many will discuss two or three different themes in their proposal.
- 3) The following reference is a little outdated but describes basic instructions as to research proposals: *Picking Research Problem—Critical Decision* by C. Ronald Kahn, M.D., <http://content.nejm.org/cgi/content/full/330/21/1530>
- 4) Allen J. Bard, CENews, "It's Not The Money, Stupid!", <http://pubs.acs.org/cen/government/88/8850gov2.html>

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